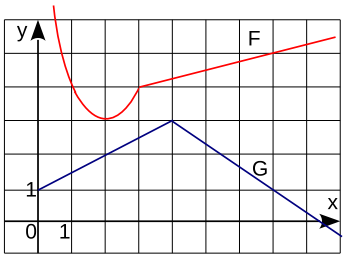
Section 3.2 **The product and quotient rules.**

Product Rule: $(f(x)g(x))' = f'(x)g(x) + f(x)g'(x)$

Quotient Rule: $\left(\dfrac{f(x)}{g(x)}\right)' = \dfrac{f'(x)g(x) - f(x)g'(x)}{g^2(x)}$

Example 1. Let $P(x) = F(x)G(x)$ and $Q(x) = \dfrac{F(x)}{G(x)}$, where F and G are the functions whose graphs are given below.



Find

1. $P'(2)$

2. $Q'(7)$

Example 2. If $f(x) = e^x g(x)$, where $g(0) = 2$ and $g'(0) = 5$, find $f'(0)$.

Example 3. Differentiate.

1. $f(x) = (x + 2\sqrt{x})e^x$

2. $f(x) = \dfrac{x^2 - 2}{2x + 3}$

3. $f(x) = \left(\dfrac{1}{x^2} + \dfrac{3}{x^4}\right)(x + 5x^3)$

Example 4. Find an equation of the tangent line to the curve $y = \dfrac{1 + x}{1 + e^x}$ at the point $\left(0, \dfrac{1}{2}\right)$.